

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This Amendment is in response to the Office Action dated June 25, 2008. By the present Amendment, the original claims 1-22 have been canceled, without prejudice, and replaced by new claims 23-40. These new claims represent revised versions of the previously pending claims 11-22, with further clarifications of the inventions. With regard to the newly presented claims, it is noted that the various objections made in paragraphs 1-6 have been attended to in the newly presented claims, and, accordingly, removal of these objections is respectfully requested.

Reconsideration and allowance of the newly submitted claims 23-40 over the 35 USC §103(a) rejection based on Jones (USP 6,233,661) in view of the article to Somaya is respectfully requested. By the present amendment, the newly submitted independent claims 23, 27 and 31 have each been drafted to define a feature of the invention which can be appreciated from Fig. 22, for example, as well as the discussion found in the specification in paragraphs such as [0130]-[0134] and paragraph [0049]. In particular, the claims have been amended to define the sequence for the SDRAM COMMAND shown in Fig. 22 of: (1) ACTV; (2) PRE; (3) READ. In other words, the memory controller of the present invention operates to first provide an active command (ACTV) for a first one of the banks of the synchronous DRAM 7 (Fig. 1). Subsequently, the precharge command (PRE) is provided for another one of the banks to be accessed after the first one of the banks. Finally, as shown in Fig. 22, the read command READ (or a write command, as discussed in paragraph [0134] of the published application) is provided for the first one of the banks (that is, the bank which receives the ACTV signal in the first place)

after the precharge command has been given for the other one of the banks. This is discussed, for example, in paragraph [0130] et seq. in detail.

The advantage of this providing of a precharge for a second one of the banks, in between the active command and the read (or write) command for a first one of the banks is discussed in paragraph [0133] as follows:

“As described above, since a page mishit occurs as an access is made over the page boundary, the advance precharge is executed for the bank next to be accessed prior to the occurrence of a mishit. Even in the case where a page mishit occurs at the fourth access cycle A3, therefore, the ACTV command can be issued at a clock cycle T6 ... As compared with the case shown in Fig. 21, the execution of the advanced precharge can reduce the delay of the read transaction, with the result that the shortened overhead time increases the data amount per unit time and can contribute to an improved bandwidth.”

It is respectfully submitted that neither of the cited references used in the rejection to Jones or Somaya teach or suggest a memory controller providing this specific sequence of commands. Figs. 7 and 8 of the Jones patent teach issuing a precharge command during a second write cycle B prior to the completion of the first write cycle A. As such, the precharge command for the second cycle is issued during idle timing during which no command is issued after the write command A has been issued for the first cycle. In the present invention, the active command ACTV for a first bank (e.g., B0) is issued, followed by a precharge command PRE for a second bank (e.g., B1) being issued, followed thereafter by a read (or write) command for the first bank B0. As such, Jones completely fails to teach or suggest such a memory controller providing this specific claimed sequence. As a result, Jones also fails to obtain the above-noted advantage concerning the improved operation using the present operation in situations where a mishit occurs.

As for the Somaya reference, this reference is only of general interest concerning a system-on-a-chip structure. There is absolutely no teaching or suggestion whatsoever in Somaya concerning the providing of a memory controller

issuing the above-noted sequence of commands. Therefore, nothing in Somaya makes up for the shortcomings of the primary reference to Jones.

Reconsideration and allowance of newly presented independent claim 40 is also respectfully requested. Claim 40 defines the above-noted features of the present invention specifically in a means+function format concerning the advantages when a mishit occurs. As such, claim 40 defines:

“means for permitting access to another of said banks, which is to be accessed after said one of said banks, even if a mishit occurs as to access to said one of said banks,”

As such, independent claim 40 defines the functional advantage of the present invention, discussed, for example, in paragraph [0133] of the published application, of improved operation regarding access to a second one of the banks even if a mishit occurs regarding access to the first one of the banks. It is noted that 35 USC §112, sixth paragraph, requires consideration of this functional feature inasmuch as the claim is properly drafted in a means+format. It is further respectfully submitted that there is absolutely nothing in either of the references to Jones or Somaya teaching or even remotely suggesting any such means. Therefore, consideration and allowance of new independent claim 40 is also respectfully requested.

Finally, consideration and allowance of the dependent claims 24-26, 28-30 and 32-39 is also respectfully requested. In each case, these claims define further specific features of the present invention which, together with the features of their respective parent independent claims, provide overall combinations which are neither taught nor suggested by the cited prior art. Therefore, consideration and allowance of these dependent claims is also earnestly solicited.

If the Examiner determines that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 500.40687CX1), and please credit any excess fees to such deposit account.

Respectfully submitted,
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